TETRA TECH

January 13, 2017

Ms. Susan Fisher
On-Scene Coordinator
U.S. Environmental Protection Agency – TLC
8600 NE Underground Drive, Pillar 253
Kansas City, Missouri 64161

Subject: Quality Assurance Project Plan for Integrated Site Assessment
US Recycling LLC Site, Ogallala, Nebraska
U.S. EPA Region 7, START 4, Contract No. EP-S7-13-06, Task Order No. 0174
Task Monitor: Susan Fisher, On Scene Coordinator

Dear Ms. Fisher:

Tetra Tech, Inc. is submitting the attached Quality Assurance Project Plan (QAPP) for the US Recycling LLC site in Ogallala, Nebraska. If you have any questions or comments, please contact the Project Manager at (816) 412-1761.

Sincerely,

Nick Patch
START Project Manager

Ted Faile, PG, CHMM
START Program Manager

Enclosures

cc Debra Dorsey, START Project Officer (cover letter only)

415 Oak Street, Kansas City, MO 64106
Tel 816.412.1741 Fax 816.410.1748 www.tetratech.com

QUALITY ASSURANCE PROJECT PLAN

INTEGRATED SITE ASSESSMENT AT US RECYCLING LLC SITE

OGALLALA, KEITH COUNTY, NEBRASKA

Superfund Technical Assessment and Response Team (START) 4 Contract
Contract No. EP-S7-13-06, Task Order 0174.000

Prepared For:

U.S. Environmental Protection Agency
Region 7
Superfund Division
11201 Renner Boulevard
Lenexa, Kansas 66219

January 13, 2017

Prepared By:

Tetra Tech, Inc.
415 Oak Street
Kansas City, Missouri 64106
(816) 412-1741

CONTENTS

Section/Table **Page**

APPENDICES

Appendix

Region 7 Superfund Program
Addendum to the Generic QAPP for Superfund Site Assessment and Targeted Brownfields Assessment Activities (October 2012)
for the US Recycling LLC Site

Project Information:

Site Name: US Recycling LLC			**City:** Ogallala	**State:** Nebraska
EPA Project Manager: Susan Fisher			**START Project Manager:** Nick Patch	
Approved By:			**Prepared For:** EPA Region 7 Superfund Division	
Title:	START Project Manager	Date: 13 Jan 2017		
Approved By:				
Title:	START Program Manager	Date: 1/13/17		
Approved By:			**Prepared By:** Nick Patch **Date:** January 2017	
Title:	START Quality Assurance (QA) Manager	Date: 1/13/17		
Approved By:				
Title:	EPA Project Manager	Date:		
Approved By:			**Tetra Tech START Project Number:** X9025.17.0178.000	
Title:	EPA QA Manager	Date:		

1.0 Project Management:

1.1 Distribution List:

EPA—Region 7: Susan Fisher, On-Scene Coordinator
Diane Harris, Region 7 QA Manager

START: Nick Patch, Project Manager
Kathy Homer, QA Manager

1.2 Project/Task Organization:

Susan Fisher, of the EPA Region 7 Superfund Division, will serve as the EPA Project Manager for the activities described in this QAPP. Nick Patch of Tetra Tech, Inc., (Tetra Tech) will serve as the START Project Manager.

1.3 Problem Definition/Background:

Description: This site-specific Quality Assurance Project Plan form is prepared as an addendum to the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated October 2012), and contains site-specific data quality objectives for the sampling activities described herein.

☒ Description attached.

☐ Description in referenced report: _____ (Title) _____ (Date)

1.4 Project/Task Description:

☐ CERCLA PA ☐ CERCLA SI ☐ Brownfields Assessment
☒ Other (description attached): ☐ Pre-CERCLIS Site Screening ☐ Removal Assessment

Other Description: Integrated Site Assessment

Schedule: Field work is anticipated to begin in March 2017 assuming access to Union Pacific Railroad property.

☐ Description in referenced report: _____ (Title) _____ (Date)

1.5 Quality Objectives and Criteria for Measurement Data:

a. Accuracy:	☒ Identified in attached table.
b. Precision:	☒ Identified in attached table.
c. Representativeness:	☒ Identified in attached table.
d. Completeness*:	☒ Identified in attached table.
e. Comparability:	☒ Identified in attached table.

Other Description:

* A completeness goal of 100 percent has been established for this project. However, if the completeness goal is not met, EPA may still be able to make site decisions based on any or all of the remaining validated data.

1.6 Special Training/Certification Requirements:

☒ OSHA 1910
☒ Special Equipment/Instrument Operator: Geoprobe® operation and groundwater sampling will be conducted by an experienced subcontractor.
☐ Other (describe below):

1.7 Documentation and Records:

☒ Field Sheets ☒ Site Log ☐ Trip Report ☒ Site Maps ☐ Video
☒ Chain of Custody ☒ Health and Safety Plan ☒ Letter Report ☒ Photos

☒ Sample documentation will follow EPA Region 7 SOP 2420.05.

☒ Other: Analytical information will be handled according to procedures identified in Table 2.

2.0 Measurement and Data Acquisition:

2.1 Sampling Process Design:

☐ Random Sampling ☐ Transect Sampling ☒ Biased/Judgmental Sampling ☐ Stratified Random Sampling
☐ Search Sampling ☐ Systematic Grid ☐ Systematic Random Sampling ☒ Definitive Sampling
☐ Screening w/o Definitive Confirmation ☐ Screening w/ Definitive Confirmation
☒ Sample Map Attached

The proposed sampling scheme for this project will incorporate a combination of biased/judgmental sampling with definitive laboratory analysis, in accordance with procedures included in the *Guidance for Performing Site Inspections Under CERCLA*, Office of Solid Waste and Emergency Response (OSWER) Directive #9345.1-05, September 1992. All samples will be submitted for analysis by the EPA Region 7 fixed laboratory or the EPA Region 7 mobile laboratory. See Appendices A and B for additional site-specific information and maps. The proposed number of samples was determined by the EPA Project Manager, and represents a reasonable attempt to meet the study objectives while staying within the budget constraints of a typical site investigation.

Sample Summary Location	Matrix	# of Samples*	Analysis
Outdoors in suspected contaminated soils, 7 feet below ground surface (bgs)	Soil gas	52	Volatile organic compounds (VOC) (via EPA Region 7 mobile laboratory)
Geoprobe® direct-push technology (DPT) temporary wells, 30 locations, four depths	Groundwater	120	VOCs (at EPA Region 7 fixed laboratory)
Geoprobe® DPT borings, 30 locations, two depths	Soil	60	VOCs (at EPA Region 7 fixed laboratory)

*NOTE: QC samples are not included with this total; however, background samples are. See Table 1 for a complete sample summary.

2.2 Sample Methods Requirements:

Matrix	Sampling Method	EPA SOP(s)
Soil gas	A 0.5-inch soil probe will be driven to shallow depth by use of a demolition hammer, and samples will be collected by use of a Tedlar bag.	SOP 2318.10
Groundwater	At Geoprobe® temporary wells, groundwater samples will be collected through polyethylene tubing fitted with a check valve that will be inserted into a Screen Point 16 sampling apparatus containing a disposable polyvinyl chloride (PVC) or reusable stainless steel screen.	SOPs 4230.07 & 4231.2007
Soil	Subsurface soil samples will be collected by use of a Geoprobe® direct-push apparatus, using Macro-Core samplers fitted with PVC liners, and will be transferred to the appropriate sample containers.	SOP 4230.07; Method 5035

2.3 Sample Handling and Custody Requirements:

☒ Samples will be packaged and preserved in accordance with procedures defined in Region 7 EPA SOP 2420.06.
☒ COC will be maintained as directed by Region 7 EPA SOP 2420.04.
☒ Samples will be accepted according to Region 7 EPA SOP 2420.01.

☐ Other (Describe):

2.4 Analytical Methods Requirements:

☒ Identified in attached table.
☒ Rationale: The requested analyses have been selected based on the historical information on the site and program experience with similar types of sites.

☐ Other (Describe):

2.5 Quality Control Requirements:

☐ Not Applicable
☒ Identified in attached table.
☒ In accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated October 2012).
☒ Describe Field QC Samples: For this investigation, field QC samples will include six field duplicates (water), one field blank (water), one trip blank (water), and one rinsate blank sample, each prepared with deionized (DI) water provided by the EPA Region 7 laboratory. The water trip blank will be used to evaluate contamination introduced during transportation of the containers/samples. The field blank will be collected to evaluate contamination of sampling containers and/or preservatives, and to assess contamination potentially introduced during sampling and laboratory procedure(s). The equipment rinsate will evaluate effectiveness of decontamination procedures for Geoprobe® groundwater sampling equipment. Evaluation of blank samples depends on the levels of contamination found in environmental samples to determine whether the environmental samples are representative. Analytical results from blank samples will be evaluated qualitatively by the EPA Project Manager and EPA contractor(s) to determine a general indication of contamination potentially introduced in the field or laboratory.
☐ Other (Describe):

2.6 Instrument/Equipment Testing, Inspection, and Maintenance Requirements:

☐ Not Applicable
☒ In accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated October 2012).

☒ Other (Describe): Testing, inspection, and maintenance of field instruments (photoionization detector, Global Positioning System [GPS] units) will comply with manufacturers' recommendations. Testing, inspection, and maintenance of analytical instrumentation will comply with the previously referenced SOPs and/or manufacturers' recommendations.

2.7 Instrument Calibration and Frequency:

☐ Not Applicable
☒ Inspection/acceptance requirements accord with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated October 2012).
☒ Calibration of laboratory equipment will occur as described in the previously referenced SOPs and/or manufacturers' recommendations.

☒ Other (Describe): Calibration of field instruments (photoionization detector) will occur daily, as described in the manufacturers' recommendations.

2.8 Inspection/Acceptance Requirements for Supplies and Consumables:

☐ Not Applicable
☒ In accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated October 2012).
☒ All sample containers will meet EPA criteria for cleaning procedures for low-level chemical analysis. Sample containers will have Level II certifications provided by the manufacturer in accordance with pre-cleaning criteria established by EPA in *Specifications and Guidelines for Obtaining Contaminant-Free Containers.*

☐ Other (Describe):

2.9 Data Acquisition Requirements:

☐ Not Applicable
☒ In accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated October 2012).
☒ Previous data/information pertaining to the site (including other analytical data, reports, photos, maps, etc., which are referenced in this QAPP) have been compiled by EPA and/or its contractor(s) from other sources. Some of that data has not been verified by EPA and/or its contractor(s); however, the information will not be used for decision-making purposes by EPA without verification by an independent professional qualified to verify such data/information.

☐ Other (Describe):

2.10 Data Management:

☒ All laboratory data acquired will be managed in accordance with Region 7 EPA SOP 2410.01.

☐ Other (Describe):

Region 7 Superfund Program
Addendum to the Generic QAPP for Superfund Site Assessment and Targeted Brownfields Assessment Activities (October 2012)
for the US Recycling LLC Site

3.0 Assessment and Oversight:

3.1 Assessment and Response Actions:

☒ Peer Review ☒ Management Review ☐ Field Audit ☐ Lab Audit

☒ Assessment and response actions pertaining to analytical phases of the project are addressed in Region 7 EPA SOPs 2430.06 and 2430.12.

☐ Other (Describe):

3.1A Corrective Action:

☒ Corrective actions will be taken at the discretion of the EPA Project Manager whenever there appear to be problems that could adversely affect data quality and/or resulting decisions affecting future response actions pertaining to the site.

☐ Other (Describe):

3.2 Reports to Management:

☐ Audit Report ☐ Data Validation Report ☐ Project Status Report ☐ None Required

☒ A letter report describing the sampling techniques, locations, problems encountered (with resolutions to those problems), and interpretation of analytical results will be prepared by Tetra Tech START and submitted to EPA.
☒ Reports will be prepared in accordance with the Generic Quality Assurance Project Plan for Superfund Site Assessment and Targeted Brownfields Assessment Programs (updated October 2012).

☐ Other (Describe):

4.0 Data Validation and Usability:

4.1 Data Review, Validation, and Verification Requirements:

☐ Identified in attached table.
☒ Data review and verification will accord with the Generic Quality Assurance Project Plan for Superfund Integrated Assessment and Targeted Brownfields Assessment Program (updated October 2012).
☒ Data review and verification will be performed by a qualified analyst and the laboratory's section manager as described in Region 7 EPA SOPs 2430.06, 2430.12, and 2410.10.

☐ Other (Describe):

4.2 Validation and Verification Methods:

☐ Identified in attached table.
☒ The data will be validated in accordance with Region 7 EPA SOPs 2430.06, 2430.12, and 2410.10.
☒ The EPA Project Manager will inspect the data to provide a final review. The EPA Project Manager will review the data, if applicable, for laboratory spikes and duplicates, laboratory blanks, and field QC samples to ensure the data are acceptable. The EPA Project Manager will also compare the sample descriptions with the field sheets for consistency, and will ensure appropriate documentation of any anomalies in the data.

☐ Other (Describe):

4.3 Reconciliation with User Requirements:

☐ Identified in attached table:
☒ If data quality indicators do not meet the project's requirements as outlined in this QAPP, the data may be discarded, and re-sampling or re-analysis of the subject samples may be required by the EPA Project Manager.

☐ Other (Describe):

Region 7 Superfund Program
Addendum to the Generic QAPP for Superfund Site Assessment and Targeted Brownfields Assessment Activities (October 2012)
for the US Recycling LLC Site

Table 1: Sample Summary

Site Name: US Recycling LLC Site | **Location:** Ogallala, Nebraska

START Project Manager: Nick Patch | **Activity/ASR #:** To be determined | **Date:** January 2017

No. of Samples	Matrix	Location	Purpose	Depth or other Descriptor	Requested Analysis	Sampling Method	Analytical Method/SOP
52	Soil gas	52 locations that surround Grain Elevator West, Grain Elevator East, US Recycling, and the former Ogallala Landfill	To assess presence of volatile organics near and downgradient of said facilities	At each location, one sample will be collected at 7 feet bgs.	VOCs	EPA SOP 2318.10	EPA SOP 3230.04
120	Groundwater	30 locations near and downgradient of Grain Elevator West, Grain Elevator East, US Recycling, and the former Ogallala Landfill	To assess presence of volatile organics near and downgradient of said facilities	At each location, four samples will be collected—one from the alluvial aquifer and three from the Ogallala aquifer.	VOCs	SOPs 4230.07 & 4231.2007	EPA SOP 3230.13
60	Soil	30 locations that surround Grain Elevator West, Grain Elevator East, US Recycling, and the former Ogallala Landfill	To assess presence of volatile organics near and downgradient of said facilities	At each location, a shallow and deep sample will be collected at depths based on photoionization detector response or at default depths of 4 and 12 feet bgs.	VOCs	EPA SOP 4230.07 and Method 5035	EPA SOP 3230.16
QC Samples							
1	Water	Field blank	To assess field-introduced and laboratory-introduced contamination	Not applicable	VOCs	NA	EPA SOP 3230.13
1	Water	Rinsate Blank	To assess adequacy of decontamination procedures	Not applicable	VOCs	NA	EPA SOP 3230.13
1	Water	Trip Blank	To assess transportation-related contamination	Not applicable	VOCs	NA	EPA SOP 3230.13

Region 7 Superfund Program Addendum to the Generic QAPP for Superfund Site Assessment and Targeted Brownfields Assessment Activities (October 2012) for the US Recycling LLC Site								
Table 2: Data Quality Objective Summary								
Site Name: US Recycling LLC				**Location:** Ogallala Nebraska				
START Project Manager: Nick Patch				**Activity/ASR #:** To be determined			**Date:** January 2017	
Analysis	**Analytical Method**	**Data Quality Measurements**					**Sample Handling Procedures**	**Data Management Procedures**
		Accuracy	**Precision**	**Representativeness**	**Completeness**	**Comparability**		
Soil Gas								
VOCs	See Table 1	Per analytical method	Per analytical method	Judgmental sampling based on professional judgment of the sampling team	100%; no critical samples have been identified	Standardized procedures for sample collection and analysis will be used.	See Section 2.3 of QAPP form.	See Section 2.10 of QAPP form.
Groundwater								
VOCs	See Table 1	Per analytical method	Per analytical method	Judgmental sampling based on professional judgment of the sampling team	100%; no critical samples have been identified	Standardized procedures for sample collection and analysis will be used.	See Section 2.3 of QAPP form.	See Section 2.10 of QAPP form.
Soil								
VOCs	See Table 1	Per analytical method	Per analytical method	Judgmental sampling based on professional judgment of the sampling team	100%; no critical samples have been identified	Standardized procedures for sample collection and analysis will be used.	See Section 2.3 of QAPP form.	See Section 2.10 of QAPP form.

APPENDIX A

SITE-SPECIFIC INFORMATION REGARDING SOIL GAS, GROUNDWATER, AND SOIL SAMPLING AT THE US RECYCLING LLC SITE

INTRODUCTION

The Tetra Tech, Inc. (Tetra Tech) Superfund Technical Assessment and Response Team (START) has been tasked by the U.S. Environmental Protection Agency (EPA) Region 7 Superfund Division under contract number EP-S7-13-06 to conduct soil gas, groundwater, and soil sampling in the vicinity of four areas of interest in Ogallala, Keith County, Nebraska, which include: Alter Metal Recycling (formerly US Recycling LLC), Grain Elevator West (operated by the Farmers Cooperative Association), Grain Elevator East (vacant), and the former City of Ogallala landfill (currently a shooting range). This investigation will proceed under authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). The assessment will involve collection of environmental samples to determine whether sources additional to those previously suspected are present at the site and contributing to the volatile organic compound (VOC) plume associated with the Ogallala Groundwater Contamination site, Operating Unit (OU) 1. This assessment will accord with EPA's *Guidance for Performing Preliminary Assessments under CERCLA*, publication 9345.0-01A, September 1991; *Guidance for Performing Site Inspections under CERCLA. Interim Final*, publication 9345.1-05, September EPA 1992; and Reference Guide titled *"Improved Site Assessment: Abbreviated Preliminary Assessments"* – publication 98-963308, October 1999.

This Quality Assurance Project Plan (QAPP) identifies site-specific features and addresses elements of the sampling strategy and analytical methods proposed for the investigation.

SITE BACKGROUND INFORMATION

Information regarding the site's location, description, geology, hydrogeology, and relevant investigation history appears in this section.

Site Location/Description

The four areas of interest are in the City of Ogallala, Keith County, Nebraska (Figure 1, Appendix B). The City lies on the north bank of the South Platte River at the southeast corner of the Nebraska Panhandle, and has an estimated population of 4,570 (U.S. Census Bureau 2016). Interstate 80 is south, and the Colorado border is approximately 25 miles southwest of Ogallala. Most of Ogallala is within Section 6, Township 13 North, Range 38 West, on the Ogallala and Ogallala SW 7.5 minute topographic quadrangle maps (U.S. Geological Survey [USGS] 1971). Ogallala is at the intersection of U.S. Highway 26 and U.S. Highway 30. Coordinates and addresses of each area of interest are listed in Table 1 below.

TABLE 1

AREAS OF INTEREST
US RECYCLING LLC SITE, OGALLALA, NEBRASKA

Area of Interest	Address	Latitude	Longitude
Alter Metal Recycling	510 E Railroad St	41.124494° N	101.71298° W
Grain Elevator West	302 E Railroad St	41.123357° N	101.721619° W
Grain Elevator East	100 E Railroad St	41.124072° N	101.716024° W
Former City Landfill	Unknown	41.122843° N	101.709705° W

The task order for this activity specifies an Integrated Site Assessment (ISA) of the four areas of interest, which are among potential source areas identified in previous investigations completed by EPA and the Nebraska Department of Environmental Quality (NDEQ) regarding the Ogallala Groundwater Contamination Site (Comprehensive Environmental Response, Compensation, and Liability Information System [CERCLIS] Number NED986369247). Two known groundwater contamination plumes are associated with the site's two operable units (OU) 1 and 2. The plume associated with OU1 extends just north of Grain Elevator West and beneath the other three areas of interest. Alter Metal Recycling and the two grain elevators are within Union Pacific Railway property, while the former landfill is on city property. All locations are within the city limits of Ogallala in Keith County, Nebraska, within Sections 5 and 6, Township 13 North, Range 38 West, and the southeast portion of Section 1, Township 13 North, Range 39 West (Figure 1, Appendix B) (U.S. Geological Survey [USGS] 1971).

Geology and Hydrogeology

The following description of the regional and local geology and hydrogeology is taken from the Soil Survey of Keith County, Nebraska (U.S. Department of Agriculture 1977), and the Draft Ground Water Report, Ogallala Ground Water Contamination Site, Ogallala, Nebraska (Draft Ground Water Report), prepared by Stantec Consulting Corporation (Stantec) on behalf of the Ogallala Superfund Site Potentially Responsible Parties (PRP) Group (the Group) (Stantec 2008a).

The site is within the High Plains Physiographic Province, which is characterized by flat to gently rolling terrain that slopes gently eastward away from the Rocky Mountains. This extensive plain was formed by stream deposition of sediments that were transported during erosion of the Rocky Mountains. Erosion has created escarpments that typically mark the boundary of the High Plains.

The regional stratigraphy, according to geologic mapping and borehole logs, consists of Cretaceous-age Pierre Shale overlain by the Fox Hills and Laramie sandstones. The next younger units belong to the Tertiary-age (Oligocene) White River Group, which consists of the Chadron and Brule Formations. The

clay-rich Chadron Formation was deposited on an erosional surface of the Laramie Formation. The younger member of the White River Group is the Brule Formation, which consists of primarily siltstone with coarser grained channel deposits. The Brule Formation is generally considered the base of the High Plains Aquifer Group. The overlying Tertiary-age (Miocene) Ogallala Formation is the principal geologic unit of the High Plains Aquifer Group, and consists of unconsolidated gravel, sand, silt, and clay interlayered with caliche. Much of the Ogallala Formation is exposed at the surface, except in areas overlain by Quaternary dune sands and alluvium consisting primarily of eroded and reworked Ogallala materials. Thickness of the Ogallala Formation ranges from 0 to 500 feet, while thickness of the alluvial deposits ranges from 0 to 290 feet.

Average annual precipitation in Ogallala, Nebraska, is 17.7 inches per year, resulting in a semiarid climate. While widespread use of groundwater from the High Plains aquifer for irrigation, domestic uses, stock, industrial purposes, and public water supply wells has lowered the water table across much of Nebraska, this is not the case in the vicinity of Keith County. Groundwater recharge from the North and South Platte Rivers, as well as from Lake McConaughy to the north, has mitigated excessive water table depletion in the Keith County area.

Based on available potentiometric surface maps, the regional groundwater flow gradient in Keith County has not changed appreciably since 1941, and generally is toward the east at a gradient of approximately 0.0018 feet per foot (ft/ft).

The site is within the historical floodplain of the South Platte River. Based on project boreholes, the Ogallala Formation is overlain by approximately 30 feet of unconsolidated alluvial materials (gravel, sand, silt, and clay), referred to as the Ash Hollow Member. The alluvium increases in thickness in the current floodplain of the South Platte River, and is reported to be over 100 feet thick in some areas due to deep erosional incisions by the paleochannel of the South Platte River. Generally, at the bottom of the Ash Hollow Member, the sediments transition from fine-grained to coarse-grained. However, at some locations, no change in lithology between the Ash Hollow Member and the underlying Ogallala Formation is easily observable.

Below the Ash Hollow Member, the Upper Ogallala Formation consists of sands to silty sands with a few minor clay lenses. Thickness of the Upper Ogallala Formation ranges from 40 to 60 feet in local monitoring wells, with an average thickness of 50 feet. Near the site, this portion of the formation is about 60 feet thick. A silt and clay layer is present at approximately 90 feet below ground surface (bgs) (referred to as the "90-foot Clay Layer") beneath the site, and is fairly extensive along the plume length,

but does not appear to be continuous throughout Ogallala. The 90-foot Clay Layer is considered to form the boundary between the Upper and Lower Ogallala Formations. This fine-grained silt and clay lens ranges from 0 to 20 feet in thickness, with an average thickness of approximately 10 feet, where present.

The Lower Ogallala Formation tends to be heterogeneous. Clay to sandy clay layers are interbedded with gravel to sandy gravel layers in this unit across the site. This unit is approximately 90 feet thick. Because no investigation boreholes penetrate the entire thickness of the unit, average thicknesses have been estimated from measurements at off-site wells. The Brule Clay forms the base of the Lower Ogallala Formation.

In the vicinity of the site, groundwater is typically first encountered within the alluvium, at approximately 12 to 15 feet bgs. Depth to water generally increases toward the north and the west due to increasing ground surface elevation.

Groundwater within the alluvial deposits and Ogallala Formation is generally considered unconfined, as no continuous confining unit is present above the Brule Formation. The groundwater flow is primarily in the horizontal direction with a very minor vertical component. However, the vertical component was likely more significant prior to shutdown of the city well field in the mid-1990s. Groundwater fate and transport modeling indicates that vertical gradients induced by groundwater pumping resulted in increased downward migration of targeted VOCs into the Ogallala Formation. The city well field was subsequently relocated to an area northeast of the City.

Local groundwater flow gradient and direction are very similar to regional gradient and flow direction. A consistent gradient, averaging 0.0015 ft/ft, has been observed in the Ogallala Formation. Flow direction is generally toward the east, with a slight trend toward the south.

PREVIOUS INVESTIGATIONS

Since 1987, when the Nebraska Department of Health first detected VOCs in five of the nine municipal wells serving the City of Ogallala (EPA 2009a), multiple investigations of the Ogallala Groundwater Contamination site, OU1, have been conducted. The former TRW Inc./Goodall Facility/American ShiZuki Corporation (TRW/ASC) property was identified as a potentially responsible party (PRP) in the Record of Decision (ROD) (EPA 1999). The facility on this property had manufactured electrical components since the early 1960s. It was owned and operated by TRW, Inc., until 1986; ASC took over operations in 1987. The Arnold Engineering facilities at 414 West 2nd Street and 601 West 1st Street

manufactured electronics components under the name Ogallala Electronics, and were also identified as a PRP at the site (EPA 1999).

A Remedial Investigation (RI) of the Ogallala Groundwater Supply (OU1 and OU2) site occurred in 1996. The RI included the following tasks:

- Development of a site-wide database of existing wells
- Installation of 25 groundwater monitoring wells (MW) at 15 locations in the alluvial deposits and Ogallala Formation of the High Plains aquifer
- Groundwater sampling and analysis from 83 wells across the full extent of the site; 64 wells tested in a second sampling round
- Multiple hydraulic tests on a variety of wells across the site
- Collection and analysis of soil samples during two rounds at selected potential source areas
- Collection and analysis of surface water and/or sediment samples during two rounds from five ponds and the South Platte River
- Collection and analysis of 16 air samples from residential basements.

The site-wide sampling program included collection and analysis of 147 groundwater samples, 62 soil samples, 16 air samples, 14 sediment samples, and eight surface water samples. Carbon tetrachloride, bis(2-ethylhexyl) phthalate, tetrachloroethene (PCE), trichloroethene (TCE), and 1,2-dichloroethane (DCA) were identified as the non-fuel related volatile organic contaminants in the groundwater samples that exceeded EPA's Maximum Contaminant Levels (MCL). TCE contamination in the alluvial deposits was identified primarily in a groundwater plume that extends eastward across the south-central part of town. Highest concentrations were reported in monitoring wells MW-1 and OE-MW-7B. In the Ogallala Formation, RI results also indicated that the principal TCE plume was in the south-central part of town (Fluor Daniel Environmental Services 1996).

EPA issued its ROD for OU1 in April 1999, and selected (1) continued operation of the extraction and treatment system at ASC until contaminant concentrations would be susceptible to remediation by natural attenuation, (2) institutional controls, and (3) groundwater monitoring for eight quarters to determine if natural attenuation would address the residual contamination (EPA 2009a).

Additional investigation in 2004 included advancement of 16 soil borings and installation of 10 monitoring wells within OU1. Ten of the soil borings were advanced within the alluvial deposits, and

six were advanced within the Ogallala Formation. Collection and analysis of 30 soil samples and 57 groundwater screening samples occurred.

In 2005, the PRPs completed a treatability study using in-situ chemical oxidation to determine if this technology would address the "hot spots" that remained in groundwater. They also installed additional groundwater monitoring wells and requested that EPA consider extending the quarterly groundwater monitoring for the newly installed wells for at least 8 quarters. In 2007, the PRPs were granted an additional 18 months to submit documentation to support monitored natural attenuation (MNA) and in-situ chemical oxidation. The documentation, which included a report and updated modeling, was received by EPA in November 2008 (EPA 2009a).

In October 2009, following EPA review of the November 2008 Draft Ground Water Report, EPA requested that the PRPs conduct additional response actions. EPA based this request on (1) persistent TCE concentrations in groundwater monitoring wells downgradient of the ASC facility and concerns that MNA as a sole remedy would not suffice to achieve remedial action objectives without adequate source control measures, and (2) elevated TCE concentrations in an alluvial deposit monitoring well (AL-1-04) downgradient of the Schmidt Motors and Arnold facilities. The requested response actions included the following: investigate potential sources at the ASC and Arnold properties; identify and investigate other potential source areas, and as appropriate, remove source areas; and delineate the horizontal and vertical extents of contaminants of concern within groundwater in the alluvial deposits and Ogallala Formation (EPA 2009b).

Elevated concentrations of TCE have been documented in groundwater monitoring wells upgradient of Humphreys Auto Supply—with the highest recent TCE concentrations in upgradient monitoring wells OE-MW-07B (110 micrograms per liter [µg/L] in June 2013) at the southeast corner of the Schmidt Motors site, and in AL-1-04 (1,400 µg/L in May 2012) on the corner of West 1st Street and West D Street, on the southwest corner of the Humphreys Auto Supply building. Within the last 7 years, TCE concentrations in these wells have fluctuated significantly, with concentrations ranging from non-detect to 2,000 µg/L. Within this period occurred two separate events involving treatment of the aquifer via in-situ chemical oxidation. In April 2005, 2,460 gallons of 10-percent potassium permanganate solution was injected into 23 probe locations (SECOR International Inc. 2005). In October 2007, approximately 21,700 gallons of 5-percent sodium permanganate was injected into the alluvial aquifer at 53 locations (Stantec 2008b). These injections and fluctuations of the water table likely caused the fluctuating sample results associated with wells OE-MW-07B and AL-1-04.

In November 2010, under contract to NDEQ, Tetra Tech EM, Inc. conducted an abbreviated preliminary assessment (APA) and site investigation (SI) at the Schmidt Motors facility. Based on Tetra Tech EM Inc.'s observations and findings during the APA in November 2010, Tetra Tech EM Inc. recommended an SI, including collection of environmental samples, to determine whether Schmidt Motors was a source contributing to the VOC plume associated with the Ogallala Groundwater Contamination site, OU1. In August 2011, Tetra Tech EM Inc. collected soil samples from 13 borings, as well as groundwater samples from 15 direct-push technology (DPT) temporary wells. Two soil samples were collected at each of 11 locations at the Schmidt Motors facility, and at two locations in a drainage ditch east of the ASC facility. Low concentrations of TCE and 1,2,4-trimethylbenzene were identified in five of the soil samples collected at the Schmidt Motors facility. No VOCs were detected in the soil samples collected from the drainage ditch east of the ASC facility (Tetra Tech EM Inc. 2011).

Temporary wells were sampled at two depth intervals, typically near the lower portion of the shallow (alluvial) aquifer (around 25 to 30 feet bgs) and at the top of the water table (around 15 to 17 feet bgs). TCE concentrations exceeded benchmark levels in 18 groundwater samples collected at two depths at 12 DPT boring locations at the Schmidt Motors facility. TCE was not detected in groundwater samples collected from DPT wells installed along the drainage ditch east of ASC. No other VOC concentrations exceeded their respective MCLs or NDEQ voluntary cleanup program (VCP) goals.

In June 2011, Stantec performed Ogallala Formation plume delineation and focused screening level source investigations (Stantec 2012). The scope of work consisted of:

- **Ogallala Formation Plume Delineation –** Discrete groundwater sampling was conducted at eight DPT borings. At each location, groundwater was sampled from multiple depths as shallow as 25 feet bgs to as deep as 134 feet bgs.
- **Focused Screening Level Source Investigation –** Discrete groundwater sampling was conducted at 10 DPT borings, advanced within three general areas, at depths of approximately 35 to 40 feet bgs:
    - Upgradient of Arnold Engineering (601 West 1st Street) – Four borings were advanced upgradient of the Arnold facility, with samples collected at 15, 25, and 35 feet bgs.
    - Summers-Zoellner Ford (602 West 1st Street) – Three borings were advanced upgradient and downgradient of this facility, with samples collected at 15, 25, and 35 feet bgs.
    - Cox Chevrolet (201 West 1st Street) – Three borings were advanced upgradient and downgradient of this facility, with samples collected at 15, 25, and 35-40 feet bgs.

- **Groundwater Monitoring Well Sampling –** Groundwater samples were collected from two existing wells—OE-MW-01B (bottom depth of 27 feet) and OE-MW11 (bottom depth of 28 feet)—to evaluate the contribution of targeted VOCs from potential sources upgradient of the Arnold Engineering facility.

Based on the sampling data, Stantec concluded that the following facilities were likely contributors of targeted VOCs to the OU1 plume:

- **Unidentified location upgradient of the Arnold Engineering facility** – unrelated to the ASC facility or any other known facility. The data did not indicate this location as significant as the other sources listed below, especially because concentrations of targeted VOCs were very low or attenuated a short distance downgradient of the Arnold facility.

- **Schmidt Motors facility** – the most significant potential source of targeted VOCs in the western portion of OU1 based on recent and past groundwater monitoring results.

- **OU2 plume** – an ongoing source of PCE.

- **Unidentified location in central portion of the plume** – distinguished from sources of targeted VOCs in the western plume by presence of carbon tetrachloride.

Stantec further concluded that the reported concentrations did not indicate the following facilities as likely significant contributors of targeted VOCs to the OU1 plume:

- Summer-Zoellner Ford
- Cox Chevrolet
- A&P Muffler
- ASC facility
- Satellite Schmidt Motors Shop.

Tetra Tech START conducted a site investigation (SI) in 2014 to evaluate additional potential source areas and to further assess the nature and extent of groundwater contamination. Groundwater sampling included collection of 151 groundwater samples at depths ranging from 24 to 84 feet from 48 borings across the City of Ogallala. Contamination in both the alluvial aquifer and the deeper Ogallala aquifer were characterized. The SI concluded that the upgradient portion of the OU1 plume should extend farther west and that the plume appeared to be continuous rather than broken (Tetra Tech 2014). The SI also concluded that the former Ogallala city dump may be a contributor of TCE to the OU1 plume, based on results from wells near the area. Carbon tetrachloride and/or chloroform were also found in a number of wells, suggesting that Grain Elevators East and West may be contributing these compounds to the plume. Carbon tetrachloride, of which chloroform is a degradation compound, was a common grain fumigant in the past and used extensively at grain elevators.

SAMPLING STRATEGY AND METHODOLOGY

This activity will involve collection of soil gas, groundwater, and soil samples in the vicinity of areas that may be contributing to the VOC contamination in groundwater near or within the OU1 contamination plume. Sample collection activities may require up to three mobilizations of approximately 4 days each, the first of which is tentatively scheduled to begin in March 2017. Field work may occur later due to delays in gaining access to Union Pacific Railroad property. Soil gas and groundwater sampling will be conducted during the first mobilization; soil sampling and any additional groundwater sampling during the second mobilization; and, if required, subslab soil gas and indoor air sampling during a third mobilization. When applicable, the standard operating procedures (SOP) and chain-of-custody (COC) procedures referenced in this QAPP will be followed throughout sampling activities to verify integrity of samples from time of collection until submittal for laboratory analysis. Disposal of investigation-derived wastes (IDW) and procedures for equipment and personal decontamination will be addressed in a site-specific health and safety plan prepared by Tetra Tech. Most IDW is expected to consist of disposable sampling supplies (tubing, gloves, paper towels, etc.) that will be disposed of off site as uncontaminated solid waste. Some IDW such as purge water may require containerization and sampling prior to disposal. Descriptions of the sampling strategy and procedures follow.

Soil Gas Sampling Procedures

Tetra Tech proposes to collect soil gas samples at 52 locations in the vicinity of the four areas of interest described above. A 0.5-inch soil probe will be driven to 7 feet bgs by use of a demolition hammer. The probe then will be extracted about 3 inches, opening up a sampling port on the soil probe. At least two probe volumes of soil gas will be purged. When the vacuum in the port returns to atmospheric pressure, the sampling train will be connected.

The vapor grab sample will be collected by connecting a 1-liter Tedlar bag to each sampling port and drawing air into the bag by use of a vacuum pump. The collection must be performed at a flow rate less than or equal to 200 milliliters per minute to ensure that the vacuum on the port is not high enough to draw ambient air from above.

Samples will be analyzed on site for VOCs by EPA Region 7's mobile laboratory via SOP 3230.04. Based on mobile laboratory results, EPA and START may also collect soil vapor samples for verification analysis at the EPA Region 7 laboratory (an estimated three verification samples for this sampling activity).

Groundwater Sampling Procedures

Tetra Tech proposes to advance 30 DPT temporary wells for groundwater sampling. As shown on Figure 2 of Appendix B, anticipated locations of the DPT borings are in the vicinity of the four areas of interest described above. Locations are generally oriented in north-south lines perpendicular to the predominant groundwater flow direction, and complement previous studies (e.g., Tetra Tech 2014) that were unable to sample on Union Pacific property. Most locations are downgradient of potential source areas, with several upgradient points selected to provide background levels. Background levels here may refer to known contamination levels associated with the OU1 plume, rather than natural conditions. Results will be compared to these known characteristics in order to locate additional sources of contamination. The locations were selected by the START Project Manager based on evaluation of OU1 data, previous investigations, and input from the EPA On-Scene Coordinator.

START will collect groundwater samples within four depth intervals at each of the 30 DPT temporary wells: the alluvial formation within targeted depth interval of 24-28 feet bgs, the shallow upper Ogallala aquifer within depth intervals of 40-44 and 60-64 feet bgs, and deeper in the upper Ogallala aquifer just above the 90-foot Clay Layer within depth interval of 80-84 feet bgs.

Samples from the temporary wells will be collected by use of a Geoprobe® Screen Point 16 sampling apparatus containing either disposable, 4-foot-long, polyvinyl chloride (PVC) screens or a Geoprobe® reusable stainless steel screen. At each location, the sampler will be advanced to the maximum sampling depth (e.g., 84 feet bgs); then the screen will be exposed to the aquifer. After the screen is deployed at the bottom of the boring, a sample will be collected through disposable polyethylene tubing utilizing a check valve placed at the bottom of the tubing, after purging about 1 gallon of water. The rod string will then be lifted to the next lowest sampling interval (e.g., 40-44 ft bgs), and the screen and tubing will be purged with groundwater from the second interval prior to sampling. The procedure will be repeated within the remaining sampling intervals. Within each sampling interval, four 40-milliliter (mL) vials preserved with hydrochloric acid (HCl) will be collected for analysis for VOCs by the EPA Region 7 laboratory. The groundwater sampler and rods will be decontaminated following sampling at each well, and new tubing will be used at each well location. Approximately 140 groundwater samples (including background and quality control [QC]) from temporary wells will be submitted to the laboratory for analysis for low-level VOCs.

A field sheet will be completed for each sample submitted for Region 7 laboratory analysis. The field sheets will include the following information: property ownership information, exact sample locations

(depths and global positioning system coordinates), and analyses to be performed. All water samples will be labeled and stored in coolers maintained at or below a temperature of 4 degrees Celsius (°C) pending submittal to the EPA Region 7 laboratory.

For each DPT sample location, the address (where applicable) and global positioning system (GPS) coordinates (latitude and longitude) will be recorded. After sampling is completed, all DPT boreholes will be plugged with bentonite from the bottom of the hole to the ground surface. Any disturbance to surface materials (concrete or asphalt) will be patched with appropriate material.

Pertinent data, including sample locations, depths, and times collected, will be recorded for each sample in a field logbook.

Soil Sampling Procedures

Tetra Tech proposes to advance 30 soil borings in the vicinity of the four areas of interest; the tentative boring locations may be modified slightly based on site knowledge and previous investigation results. Borings will be advanced in areas of stained soil or distressed vegetation or near doors, drums, or other areas where contaminants may have been released. Two soil samples will be collected from each boring for laboratory analysis. Since the contaminants in question readily volatilize in open air, surface soil samples will not be collected.

Using a DPT rig, Tetra Tech will advance a soil sampler to maximum depth of 16 feet bgs at each location. Soil cores will be screened by use of a photoionization detector (PID) for presence of elevated concentrations of VOCs. Samples will be collected within the two depth intervals in the vadose zone exhibiting the highest VOC concentrations based on PID readings or visually apparent staining; if no indications of contamination are present, soil samples will be collected at 4 feet bgs and immediately above the water table. Soil samples will be collected directly from the core within selected intervals by use of tipless plastic syringes (per EPA SW-846 Method 5035), placed into appropriate prepreserved sample containers, and submitted for analysis for VOCs by the EPA Region 7 analytical laboratory.

For each DPT sample location, the address (where applicable) and GPS coordinates will be recorded. After sampling is completed, all DPT boreholes will be plugged with bentonite from the bottom of the hole to the ground surface. Any disturbance to surface materials (concrete or asphalt) will be patched with appropriate material.

After collection, each sample will be labeled, packaged accordingly, and placed in a cooler maintained at or below a temperature of 4 °C from time of collection until submittal for laboratory analysis.

Pertinent data, including sample locations, depths, and times collected, will be recorded for each sample in a field logbook.

Quality Control Samples

To evaluate sample QC, one field blank and one rinsate blank will be collected, as specified in Section 2.5 of the QAPP form. One laboratory-prepared trip blank will be submitted per sample cooler shipped to the laboratory to evaluate contamination potentially introduced during transportation of the containers and samples.

ANALYTICAL METHODS

All samples will be submitted to the EPA Region 7 fixed laboratory or the Region 7 mobile laboratory and analyzed for VOCs. Soil gas samples will be analyzed for VOCs according to the EPA Region 7 SOP 3230.04, water samples according to SOP 3230.13, and soil samples according to SOP 3230.16 as referenced on Table 1 of the QAPP form. Standard turnaround times and detection limits for those methods will be adequate for this project. Appropriate containers and physical/chemical preservation techniques will be applied during field activities to help verify acquisition of representative analytical results. Submittals of samples to the laboratory are expected in March and April 2017, corresponding to the respective mobilization dates.

REFERENCES

Fluor Daniel Environmental Services. 1996. Final Ogallala Water Supply Remedial Investigation Report. October.

SECOR International Inc. 2005. Final in Situ Chemical Oxidation (ISCO) Pilot Test Performance Evaluation Report. Ogallala Groundwater Contamination Site. Ogallala, Nebraska. October 24.

Stantec Consulting Corporation (Stantec). 2008a. "Draft Ground Water Report, Ogallala Ground Water Contamination Site, Ogallala, Nebraska." November 26.

Stantec. 2008b. "Additional In Situ Chemical Oxidation (ISCO) Pilot Test Performance Evaluation Report, Ogallala Ground Water Contamination Site, Ogallala, Nebraska." August 26.

Stantec. 2012. Technical Memorandum, Downgradient Ogallala Formation Plume Delineation and Focused Screening Level Source Identification, Ogallala Ground Water Contamination Site, Ogallala, Nebraska. February 10.

Tetra Tech EM Inc. 2011. Site Inspection Report, Revision 01. Schmidt Motors Inc., Ogallala, Nebraska. November 9.

Tetra Tech, Inc. (Tetra Tech). 2014. Final Additional Source Investigation. Ogallala Groundwater Contamination, Operable Unit 1, Ogallala, Nebraska. June.

U.S. Census Bureau. 2016. Ogallala city, Nebraska Annual Estimates of the Resident Population. Accessed on January 10, 2017. https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF.

U.S. Department of Agriculture (USDA), Soil Conservation Service. 1977. Soil Survey of Keith County, Nebraska.

U.S. Environmental Protection Agency (EPA). 1999. Record of Decision, Decision Summary, Ogallala Groundwater Contamination Site, Ogallala, Nebraska. April 23.

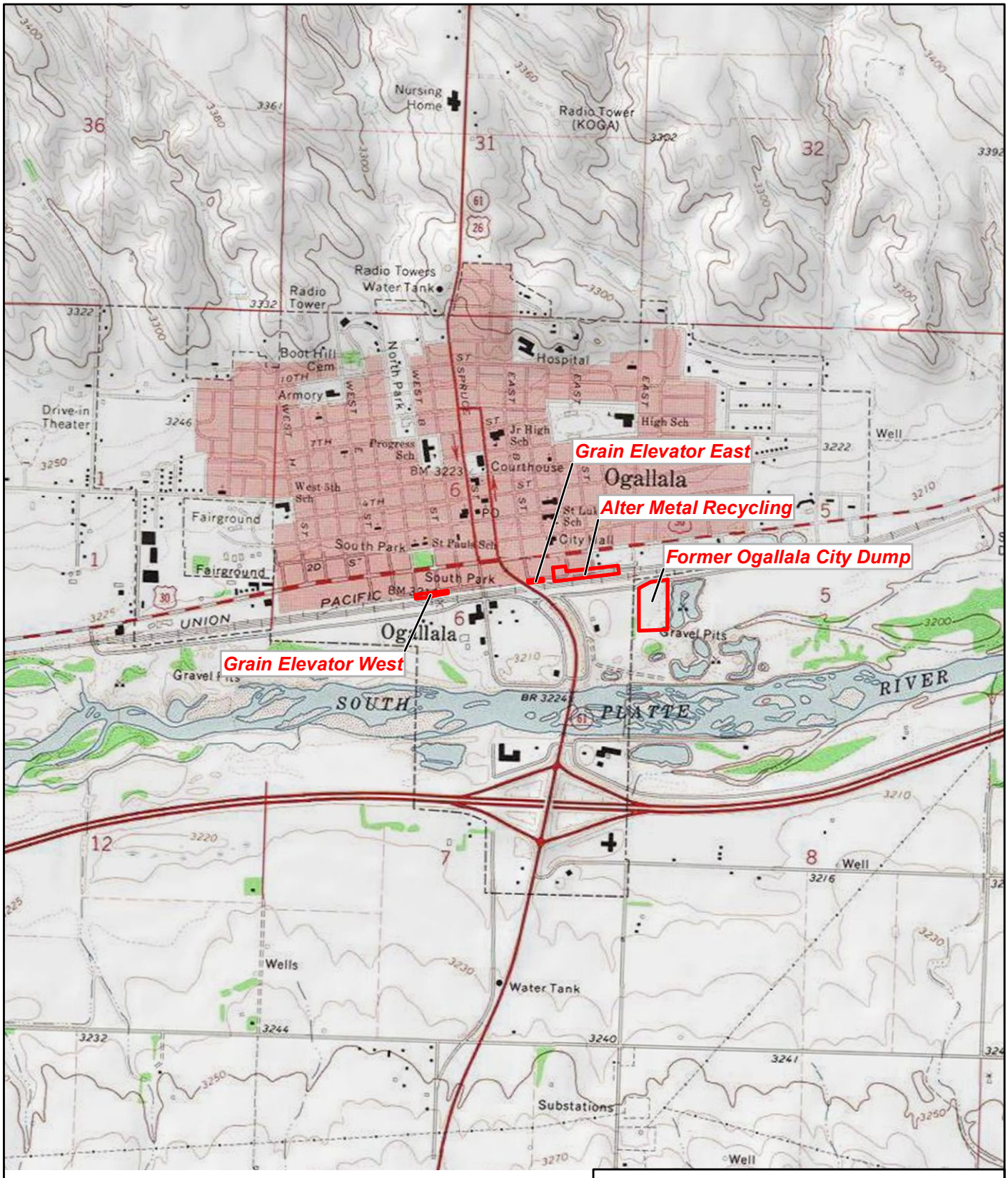
EPA. 2009a. Fact Sheet – Ogallala Groundwater Contamination Site. Accessed July 2014. http://www.epa.gov/region7/cleanup/npl_files/ned986369247.pdf.

EPA. 2009b. Letter regarding Draft Ground Water Report, November 28, 2008. From EPA. To The Dextra Group, Inc. October 22.

U.S. Geological Survey (USGS). 1971. Ogallala, Nebraska Quadrangle. 7.5-Minute Topographic Map Series.

APPENDIX B

FIGURES



Source: USGS Ogallala, NE 7.5 Minute Topo Quad, 1971; USGS Ogallala SW, NE 7.5 Minute Topo Quad, 1971; USGS Brule NE, NE 7.5 Minute Topo Quad, 1971; USGS Brule SE, NE 7.5 Minute Topo Quad, 1961

US Recycling LLC
Ogallala, Nebraska

Figure 1
Site Location Map

TETRA TECH

Date: 1/11/2017 Drawn By: Nick Wiederholt Project No: X9025.17.0174.000

X:\G\9025\0174.000\Projects\mxd\Figure1.mxd

SEE INSET 1

SEE INSET 2

Alter Metal Recycling

Former Ogallala City Dump

INSET 1

Grain Elevator East

0 25 50 Feet

INSET 2

Grain Elevator West

0 30 60 Feet

South Platte River

Legend

- Proposed DPT groundwater sample location
- Proposed DPT soil sample location
- Proposed soil gas sample location
- 2014 temporary well sample location
- State highway
- Major road
- Street
- Ramp
- Union Pacific Railroad
- Area of interest
- Expected plume trajectory

DPT Direct push technology

Source: The source of this map image is Esri, used by EPA with Esri's permission; HSIP Gold, 2007.

N

0 250 500 Feet

US Recycling LLC
Ogallala, Nebraska

Figure 2

Proposed Sample Location Map

TETRA TECH

Date: 1/11/2017 Drawn By: Nick Wiederholt Project No: X9025.17.0174.000

X:\G\9025\0174\000\Projects\mxd\Figure2.mxd